



REPORT  
ON THE WORKING OF THE  
HARCOURT BUTLER INSTITUTE OF  
PUBLIC HEALTH, RANGOON  
FOR THE YEAR 1936

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RANGOON

SUPDT., GOVT. PRINTING AND STATIONERY, BURMA

1937

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## ERRATA

TO THE

Report on the Working of the Harcourt Butler  
Institute of Public Health, Rangoon, for the year  
1936.

In page 1, line 13, *for* " Dr. " *substitute* " Mr."

In page 1, line 15, *for* " Lieutenant " *substitute* " Lieutenant."

In page 1, line 29, *for* " Dr. F. J." *substitute* " Dr. E. J."

In page 8, line 31, *for* " murisseptica " *substitute* " muriseptica."

In page 10, line 27, *for* " crocidura " *substitute* " Crocidura."

In page 11, line 15, *for* " baccilus " *substitute* " bacillus."

In page 15, line 27, *after* the word " Government " *insert* " Medical."

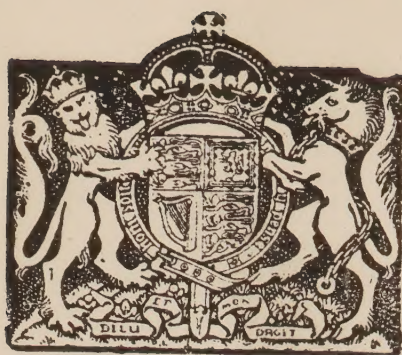
In the statement at page 22 against serial No. 9, under Column 4,  
*for* " 408°C " *substitute* " 40.8°C."

In the statement at page 23 against serial No. 16, under Column 2,  
*delete* " No." in line 1.

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NOTE —The use of capital letters for specific names throughout the report is incorrect and is regretted.





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## HARCOURT BUTLER INSTITUTE OF PUBLIC HEALTH, RANGOON

FOR THE YEAR 1936

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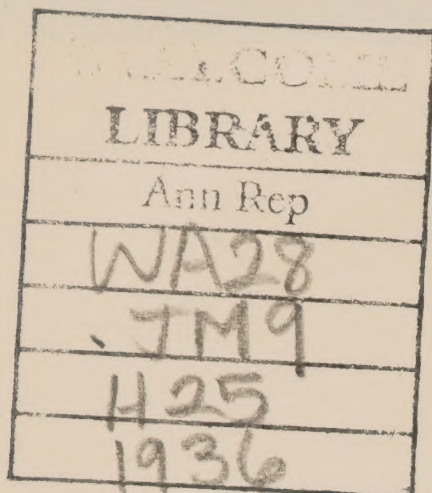
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# RESOLUTION

ON THE

## Report on the Working of the Harcourt Butler Institute of Public Health, Rangoon For the Year 1936.

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Extract from the Proceedings of the Government of Burma, Education  
Department,—No. 283SJ37, dated the 24th November 1937.

READ—

The Report on the Working of the Harcourt Butler Institute of Public  
Health, Rangoon, for the year 1936.

RESOLVED THAT—

The Report be published.

By order,

MAUNG KYAW,  
*Secretary to the Government of Burma,  
Education Department.*





# REPORT

ON THE WORKING OF THE

## Harcourt Butler Institute of Public Health, Rangoon

For the Year 1936.

### GENERAL REMARKS.

1. STAFF OF THE INSTITUTE—*Director*.—Mr. K. T. Jungalwalla, L.M. & S. (Bom.), F.R.F.P. & S. (Glas.), D.P.H., D.T.M. & H. (Cantab.), from 1st January to 7th April and from 11th August to 31st December 1936.

Major C. A. Bozman, M.B., Ch.B., D.P.H., I.M.S., from 8th April to 10th August 1936.

*Assistant Director*.—Dr. K. P. Kundu, M.B. (Cal.), D.Bact. (Lond.), throughout the year.

*Malariologist*.—Lieutenant E. S. Feegrade, D.T.M., K-I-H., I.M.D., from 1st January to 10th September 1936. On leave from 11th September to 22nd November 1936 on which date he died at the Carmichael Hospital for Tropical Diseases at Calcutta.

U Tin, D.T.M., from 23rd November to 31st December 1936.

*Public Analyst*.—Post held in abeyance.

*Assistant Chemist*.—Mr. G. C. Moitra, B.Sc., F.C.S.

*Assistant Malariologist*.—Sub-Assistant Surgeon U Tin, D.T.M., from 1st January to 22nd November 1936.

*Assistant Bacteriologist*.—Sub-Assistant Surgeon U Pa How.

2. VISITORS.—The following distinguished persons visited the Institute during the year :—

His Excellency Sir Archibald Douglas Cochrane, K.C.S.I., G.C.M.G., D.S.O., Governor of Burma, and the Hon'ble Lady Cochrane.

Professor C. D. de Langen, Mr. A. S. Haynes, and Dr. F. J. Pampana, Members of the Preparatory Commission of the Bureau of the League of Nations Health Committee.

Mrs. R. M. G. Brown, B.Sc., General Secretary, Indian Red Cross Society, Bengal Provincial Branch.

Dr. M. N. Bose, M.D., Principal of Carmichael Medical College, Calcutta.

3. COURSES OF INSTRUCTION.—The following courses of Instructions were given during the year :—

(1) A course of training of Sub-Assistant Surgeons for Government License in Hygiene.



- (2) A course of training of Public Health Inspectors ;
- (3) A course of training of Health Visitors ;
- (4) Lectures and demonstrations on Hygiene and Public Health were also given to the students of the following institutions :—
- (i) Medical College of the Rangoon University ; and
- (ii) Burma Government Medical School.
- (5) A short course of instruction on Hygiene and Public Health was given to the Post-graduate Sub-Assistant Surgeons from 7th to 30th July 1936. They were examined on the 6th November with the result that seven out of nine candidates secured a pass.
- (6) A course of training in Malaria was given to the following :—
- (i) Fourteen Mosquito Inspectors appointed by the Corporation of Rangoon, from 22nd January to 22nd February 1936.
- (ii) The Public Health Inspector of Maymyo from 1st January to 30th January 1936.
- (iii) The Public Health Inspector of Danabyu from 25th to 31st January 1936.
- (7) The representatives of local bodies from various districts of Burma, who attended the Health Week Exhibition were given a special demonstration on various technical exhibits at the Jubilee Hall. They were also given a Cinema demonstration on two films " Safety First " and " Malaria " in the lecture theatre of this Institute on 15th December 1936.

The following cinema shows and demonstrations were given at the Institute during the year :—

Date.	Attended by	Title of Film.
17-1-36	Students of the Burma Health School	(1) Prevention of Blindness and saving of the eyes.
18-1-36	Officers of the Public Health Department.	(1) Preventing the spread of disease.
22-2-36	Students of the Burma Health School	(1) Physiology 5 reels.
19-6-36	Do.	(1) Hookworm.
24-6-36	Do.	(1) Lantern slides on " Cholera " and " Fly ".
1-7-36	Do.	(1) Safety First.
6-7-36	Monday Afternoon Club ...	Films shown by Messrs. T. N. Ahuja & Co.
8-7-36	Students of the Burma Health School	(1) Malaria. (2) Lantern slides on " Consumption ".
22-7-36	Do.	(1) Malaria. (2) Lantern slides on " Plague ".
15-12-36	Representatives from various Districts	(1) Safety First. (2) Malaria.



4. MINOR WORKS AND REPAIRS.—The following minor works and repairs were carried out during the year :—

(1) Providing additional laboratory benches with sink, gas and air taps with necessary pipe connection in the bacteriological laboratory.

(2) Providing a new large sink in the plague laboratory and shifting the existing small one to a new table in the media room of the Bacteriological laboratory.

(3) Providing a new open shelf in the museum.

(4) Construction of a motor garage for four cars behind the Institute building.

(5) Providing a rat destructor and shed.

(6) Replacing of two gasometers.

(7) Construction of fish breeding tanks and nursery chambers with water connection laid on.

(8) Asphalting the road in front of the Institute.

(9) Providing a new teak-wood platform and foot rest including necessary alteration to gas and water service pipes in the lecture theatre.

5. MEETINGS.—During the year under review, 23 meetings were held in the main office at the Institute. The societies concerned were the Executive Committee and the various Sub-Committees of the Burma Branch of the Indian Red Cross Society, St. John's Ambulance Association, Baby Welcome Committee of the National Council of Women in Burma, and the Committee on School Poster Competition in connection with the Rangoon Health Week Exhibition. In addition, on nine occasions a conference of the officers of the Public Health Department was held at the Institute.

6. OFFICE.—Work in the Institute has steadily increased. The total number of correspondence during the year under review amounted to 4,309 receipts and 6,124 issues, as compared with 3,279 receipts and 4,242 issues in 1934 and 4,570 receipts and 5,528 issues in 1935. The above figures do not include bulk issues such as circulars, pamphlets and papers of a stereotyped nature.

7. ISSUE OF VACCINES.—The following table shows the issues of prophylactic vaccines during the year :—

Vaccines.			Number of requisitions complied with.	Number of doses issued.
Plague	...	...	347	199,144
Cholera	...	...	261	222,153
Influenza	...	...	11	1,650



**Report of the Bacteriologist, Dr. K. P. Kundu, M.B. (Cal.), D. Bact. (Lond.), on the Bacteriological Section for the year 1936.**

8. This section consists of three sub-sections :—

- (i) The Bacteriological laboratory proper,
- (ii) A Media making room, and
- (iii) The Plague laboratory.

The following two additions have been made in the list of routine work carried out in this laboratory as mentioned in the last year's report.

1. Histological examinations of tissue collected from cases of autopsies done on experimental animals.
2. Mounting of specimens for the museum.

9. PREPARATION OF CHOLERA VACCINE.—Large scale preparation of this vaccine was continued throughout the year, and this has turned out to be the heaviest item in the routine duties of this laboratory. During the year 284,287 doses of this vaccine were prepared, out of which 188,724 doses were filled in ampoules and issued to the store-keeper. Due to the new addition of a bacteriological table equipped with a vacuum pipe line, the filling of the vaccine in ampoules was very much facilitated. At the beginning of the manufacture, some difficulty was experienced due to the frequency of contamination of the vaccine at the time of filling with aerobic spore bearing organisms of *B. Subtilis* group. This has now been prevented by a mechanical device by which the air is now filtered through a strong solution of carbolic acid before it is passed into the filling degchies. This has reduced contamination to a considerable extent.

The preparation of vaccine was continued on the same lines as has already been mentioned in the last year's report, except that, instead of using local strains of cholera vibrio, strain 1617 of Kasauli was used uniformly in the preparation of all brews. This decision was arrived at after consulting the Director of the Central Research Institute, Kasauli, who is also using this same strain in the preparation of cholera vaccine at Kasauli. At the suggestion of Dr. Pampana, Pampana's trypanflavine test for finding out the smoothness of the strain of *V. cholera* was carried out in addition to Millon's test. The former has been found to be more sensitive than the latter.



10. BACTERIOLOGICAL EXAMINATION OF WATER SAMPLES.—The table below shows the number of water samples examined during the year and their sources :—

Hlawga Lake, chlorinated (Corporation of Rangoon)	...	52
Hlawga Lake, unchlorinated (Corporation of Rangoon)	...	52
Samples of tube well water sent by Water Officer	...	54
Maymyo	...	25
Magwe	...	24
Mandalay	...	14
Moulmein	...	12
Pyinmana	...	12
Insein	...	10
Rangoon Central Jail	...	10
Port Blair	...	7
Health Officer (Corporation of Rangoon)	...	6
Bassein	...	6
Pegu	...	5
Tharrawaddy	...	5
Meiktila	...	4
Mokpalin	...	4
Myaungmya	...	4
Harcourt Butler Institute	...	4
Nyaunglebin	...	3
Thayetmyo	...	2
Yamèthin	...	2
Myingyan	...	2
Mônýwa	...	2
Tadagale Mental Hospital	...	2
Hlègu	...	1
Kyauksè	...	1
Taungdwingyi	...	1
Port Health Officer, Rangoon	...	1
Maubin	...	1
Others	...	39
Total		367

During the latter part of the year under review beginning from the month of September, samples of water were received from Magwe regularly every month.

11. EXAMINATION OF SHAVING BRUSHES FOR THE PRESENCE OF B. ANTHRACIS.—Sixteen samples of shaving brushes of different manufacture were sent by the Appraiser of the Customs Department to be examined for the presence of Anthrax Bacillus ; on no occasion was this organism found.

12. LABORATORY EXAMINATIONS.—The following clinical examinations were carried out in this laboratory during the year under review,



the total being 75. The majority of these were received from the Medical Officer, Port Commissioners, and the rest from the Public Health Department staff :—

(a) Sputum for the presence of T. B.	...	...	28
Positive	...	6	
Negative	...	22	
(b) Specimens of urine examined both chemically and culturally.			18
(c) Specimens of faeces examined	...	...	5
B. flexneri was isolated from one specimen.			
(d) Ten nasal smears were examined for the presence of Mycobacterium Laprae. All showed negative results.			10
(e) Smears for Pr. pestis	...	...	13
(f) Food from Akyab (for the presence of Salmonella group of organisms).			1

13. PREPARATION OF BACTERIAL EMULSIONS AND HIGH TITRE SERUM.—Bacterial emulsions of the Typhoid and Paratyphoid group of organisms were prepared in accordance with the instructions detailed in the Medical Council Research Series No. 51.

The following agglutinating sera were prepared during the year under review :—

B. typhosus 'O'  
B. coli.

14. STOCK CULTURES.—Maintenance of stock cultures in a pure state is also an important duty of this section and several additions were made to our original stock during the year under review. A register is maintained for such purpose in which the source and date of cultures isolated and received are regularly entered.

15. IDENTIFICATION OF SNAKES.—Several snakes were received in this laboratory for identification. A register is now being maintained for recording such examinations, as the number of specimens received in this Institute is rapidly increasing.

16. LABORATORY ANIMALS.—Pigeons have been added to the laboratory stock of guinea pigs and rabbits, and arrangements have been made to stock white mice from next year. One hundred and thirty-six animal experiments were carried out during the year. Looking after the laboratory animals under experiment as well as those in the animal run, is done by the staff of this section. Proper registers are maintained for this purpose.



17. MEDIA SECTION.—During the year under review the following media were prepared:—

Papain digest broth	...	...	2,22,460 c.c.
Nutrient agar	...	...	28,200 c.c.
Cholera bottles	...	...	1,170
MacConkey's broth	...	...	61,980 c.c.
MacConkey's agar	...	...	4,000 c.c.
Citrate Media	...	...	} Total quantity not recorded.
Phosphate Media	...	...	
Sugar Media	...	...	
Glucose broth	...	...	
Peptone Water	...	...	
Saline (Physiological)	...	...	
Dieudonnes Media	...	...	
Levinthal Media	...	...	
Blood Agar	...	...	
Bile Salt Agar	...	...	
Lemco Broth	...	...	
Aronson Media	...	...	
Milk Media for water analysis	...	...	
Litmus milk	...	...	

From the above table it will be seen that the media section carries out heavy routine work. The washing and sterilising of all the glassware used in the manufacture of cholera vaccine and other routine work is also done by this section. The preparation of each brew of cholera vaccine (Bulk Vaccine) entails the washing and sterilising of as many as 300 pieces of glassware. The preparation of utensils for the filling of diluted cholera vaccine is also a part of the duty of this section.

18. PLAGUE SECTION.—As in previous years, the Port Health Department continued sending trapped and cyanogassed rats daily (excluding holidays) from the port area. Dead and live rats were also sent to this section from steamships. Every one of these rats was identified, dissected and smears made from spleens were examined for the presence of Pr. pestis. Examination proved negative in every case.

The following table shows the number of different species of rats sent during the year under report :—

TABLE No. 1.			
LIVE RATS (PORT AREA) BY SPECIES EXAMINED.			
N. Bengalensis	...	...	1,073
M. Concolor	...	...	587
C. Coerulea	...	...	261
M. Musculus	...	...	202
R. Rattus	...	...	106
R. Norvegicus	...	...	88
Total			2,317



TABLE No. 2.

## LIVE RATS (STEAMSHIPS) BY SPECIES EXAMINED.

R. Rattus	...	...	...	108
M. Musculus	...	...	...	71
M. Concolor	...	...	...	12
R. Norvegicus	...	...	...	4
N. Bengalensis	...	...	...	Nil.
C. Coerulea	...	...	...	Nil.
Total				195

TABLE No. 3.

## DEAD RATS (STEAMSHIPS) BY SPECIES EXAMINED.

M. Musculus	...	...	...	387
R. Rattus	...	...	...	84
R. Norvegicus	...	...	...	1
M. Concolor	...	...	...	Nil.
C. Coerulea	...	...	...	Nil.
N. Bengalensis	...	...	...	Nil.
Total				472

Four spleen smears of rat were brought by the Medical Officer, Burma Railways Hospital, Insein. All the smears were positive to *Pr. pestis*. A piece of spleen of a dead rat was also sent to this Institute for examination. The spleen sent was macerated in saline and injected into a guinea pig subcutaneously. The guinea pig at autopsy showed the typical post mortem appearance of plague and *Pr. pestis* was isolated. The guinea pig was mounted and kept in the museum of this Institute.

A dead *N. Bengalensis* was sent by Messrs. Fairweather Richard & Co. The smear from the spleen showed organisms which closely resembled, morphologically, *Pr. pestis*, while the post mortem signs were not like those of a plague rat. Cultural tests and animal inoculation showed that the organism concerned was *Pr. murisseptica*. This stresses the point that mere examination of a smear is not always sufficient to diagnose the presence of *Pr. pestis* in rats. This fact was brought to the notice of the Director of Public Health, Burma, and the Health Officer, Corporation of Rangoon, and it has been decided that in future any dead rat showing signs and symptoms of plague will be sent to this Institute from the laboratory of the Corporation of Rangoon for the verification of the diagnosis by further cultural and animal tests.



19. INSTRUCTION.—Lectures and demonstrations were given to the students of the Public Health Inspectors' Training Class, Health Visitors, and to the students of the the Medical College and the Medical School. The following subjects were taught :—

Public Health Laboratory Practice,  
Plague and its preventive measures,  
Identification of rats and rat fleas,  
Demonstration on the working of cyanogas pump.

Nine Post-graduate sub-assistant surgeons also received the above instructions.

20. HEALTH WEEK ACTIVITIES.—This section took part in the Annual Public Health Exhibition and was responsible for the sections of water bacteriology and prevention of plague.

21. INVESTIGATIONS.—The following investigations were taken in hand during the year under review. Unfortunately many of them could not be carried on without frequent interruptions as they had to be stopped on account of the pressure of routine work.

#### I. *The keeping properties of cholera vaccine as manufactured at this Institute.*

A series of protection tests in guinea pigs was carried out with vaccine which had been kept at room temperature for several months.

Two lots of vaccine were used in the experiment. The first lot manufactured on 13th September 1935 was sent out to the district on 13th December 1935 and was returned to this Institute on 12th March 1936. The second lot, prepared on 13th January 1936, was sent out to the district on 3rd February 1936 and was received back in the Institute on 18th July 1936.

After their return to the Institute they were kept at room temperature in the laboratory. Guinea pigs were injected subcutaneously with 1c.c. of these vaccines every month. In other words the animals were injected with vaccines 7 to 11 months old respectively. Each of these protected guinea pigs was given an intraperitoneal injection of a lethal dose of live *V. cholera* culture 9 days after the first injection. None of these animals died. A few control guinea pigs were similarly injected with a lethal dose of *V. cholera* culture and they invariably died. The above experiment indicates that our cholera vaccine retains its potency for about a year even when kept at room temperature for several months at a stretch. The above investigation will be repeated next year, with another batch of cholera vaccine using a freshly isolated cholera strain for intraperitoneal injection.

#### II. *Role played by C. Coerulea in the Propagation of Plague.*

The report on the Rat Flea Survey done at Mandalay in the year 1931 showed that the X. Cheopis index of *C. Coerulea* was above 2.



Incidences of rat fall are usually recorded before a plague epidemic starts among human beings. But a crocidura fall has never been recorded in spite of these animals having a high cheopis index. The following investigation was carried out in this laboratory to find the resistance of this animal to *Pr. pestis* infection.

**SHORT DESCRIPTION.**—This animal is not a rodent though it has been so styled in many publications. These mammals belong to the family Soricidae which belong to the order Insectivora. The following is a short description of their morphological characteristics. The head is long with a very pointed snout which projects considerably beyond the lower lip. The earconch somewhat resembles the human ear in shape. The molars have well developed "W" shaped cusps. The eyes are small and are nearer to the orifice of the ear than to the end of the snout. *C. Coerulea* is covered with a very soft fur. On each side of the body there is a gland whose secretion has a strong smell of musk. The genito-urinary and anal orifices both open into a shallow cloaca. The sexes are often difficult to distinguish if the mammae are not developed, the male organ being retractile and the testes internal. A full grown male measures about 6 inches from nose to vent, females are generally smaller than males.

**HABITS.**—They are always found near human habitations. They are nocturnal in their habit and frequent houses at night hunting for cockroaches and other insects, uttering at times a sharp squeaking cry.

An effort was first made to find out the cheopis index in these *Crociduras*. The result is shown in the table below :—

Period.	No. of crocidura coerulea.	No. of fleas.	No. of <i>X. cheopis</i> .	No. of <i>X. astia</i> .
6th July 1936 to 9th September 1936.	962	671 or index 0.69	596 or index 0.61	75 or index 0.08

The above table shows the predominance of cheopis infestation in these animals, though the cheopis index is much lower than that which was found in Mandalay which place is noted for its incidence of plague. However, it is intended to repeat the experiment at different seasons of the year as it is a well known fact that the flea index varies according to the weather conditions.

**RESISTANCE OF *C. COERULEA* AGAINST *PR. PESTIS*.**—*C. Coerulea* trapped in the Port area and Municipal area were sent to this Institute. They were all defleaed and kept in captivity. At the beginning some difficulty was experienced to keep *C. Coeruleas* alive in captivity owing to the fact that these are exclusively carnivorous creatures and prefer



to live in complete darkness. *Crocidura* fed on rice or bread and kept in an ordinary lighted room died in a few days. This difficulty was, however, overcome by feeding them with meat and keeping the cage in a dark room.

The experiment was carried out only after the *C. Coerulea* had been kept alive under observation for at least a week and the indigenous house rat (*M. Concolor*) was used as a control. In all, nine *C. Coeruleas* were used. The technique adopted was as follows :—

After keeping them under observation for seven days, they were injected with one c.c. of a 48 hours broth culture of *Pr. pestis*. All the nine control rats died within a period of four days. All the *C. coerulea* remained healthy for several weeks except one which died on the 9th day. The latter had an abscess at the site of injection.

The above experiment indicates that *C. Coerulea* has some degree of natural immunity against the plague bacillus. The next point that has got to be considered is what role if any do these animals play in the propagation of plague among human beings. Hirst in the year 1926-27 urged the preservation of these animals as they are enemies of rats but the very fact that they appear to be immune to plague infection weighs against Hirst's suggestion as they may play a part in acting as a reservoir of plague infected fleas. Being a semi-domesticated animal, they stand a good chance to come in contact with house rats (*M. Concolor*) and should a fight ensue, a plague infected flea that might have been harboured on the *Crocidura* may infest the *Concolor* which could result in an epizootic among rats (rat fall).

It is intended to prosecute further, this interesting and possibly important enquiry.

### III. *Effect of Sulphur Fumigation on Vermin.*

The following experiment was done in this Institute to observe the effect of sulphur fumigation on rats and vermin :—

#### Animals and insects used.

- |             |                 |
|-------------|-----------------|
| 1. Rats.    | 4. Cockroaches. |
| 2. Lizards. | 5. Bed bugs.    |
| 3. Flies.   | 6. Rat fleas.   |

The experiment was carried out on 24th July 1936 in the Plague Laboratory which has a capacity of 5,302½ cubic feet. Every precaution was taken to make the room perfectly air-tight. A total amount of 25 lbs. of sulphur was burnt. The floor of the room was sprinkled with an adequate quantity of water and in addition several trays containing water (totalling about 7 gallons) were placed on the floor as well as on the working tables. Sulphur was ignited at 3 p.m. Samples of gas were taken out and tested with the help of Clayton's gas-testing apparatus at 4 p.m. and 5 p.m. the concentration of SO<sub>2</sub> being 2 per cent and 2½ per cent respectively. At 5 p.m. nothing was visible inside the room. The



final test for the concentration of  $\text{SO}_2$  was done the following morning at 10-30 a.m., the result being 0.5 per cent. The inside of the room in the morning appeared to be quite clear, no trace of smoke being visible. The room was opened at 10-40 a.m. It took about 45 minutes before one could get inside the room to examine thoroughly the result of fumigation. All the animals and insects were found dead. The effect of sulphur fumigation on rat fleas deserves special attention. On combing the dead rats, dead fleas were recovered from every one of them. This indicates that the fleas died either before the death of the rats or that both the rats and their fleas died at the same time. If the fleas had remained alive for any length of time after the death of the rats they would have certainly left the carcasses.

Other changes that were noticed after the experiment were as follows :—

- (1) The white washed walls of the room changed to yellow.
- (2) The parquet flooring, which was nicely polished did not show any trace of wax polish.
- (3) A cake of carbolic soap that had been left in the room had a spongy appearance.
- (4) Exposed yellow papers such as are used in the office took on a mauve colour while yellow grease pencil marks were bleached into white.

#### IV. *The Viability of B. Schafferi in natural water collections and its resistance to sunlight.*

This experiment was carried out on the same lines as was done with B. 98 last year (*vide* 1935 report). Clemesha grouped it under Class I Organism. In other words, according to him, B. Schafferi does not remain alive for a long time in natural collections of water when exposed to sunlight. Hence the presence of this organism in water samples indicates recent faecal pollution of their sources. Morphologically and culturally the organism resembles B. Coli Communis except that it is non-motile.

	Lactose.	Saccharose.	Dulcite.	Adonite.	Indol.	Motility.	V.P.	Citrate.	M.R.
B. Schafferi ...	AG	-	AG	-	+	-	-	-	+
B. Coli Communis	AG	-	AG	-	+	+	-	-	+

Efforts were made to find out the serological identity of these two organisms ; this has not yet been settled. This organism was isolated



19 times in the 367 samples of water bacteriologically examined, and in the majority of cases there was some indication of pollution of the water source with alvine discharges of either human beings or cattle or wild animals. Whether this organism is present in bird droppings has still got to be proved. The presence of *B. Schafferi* in a certain water sample to which birds only had access, strongly suggests the likelihood of this organism being present in bird droppings. Experiments were carried out on two different lines to find the resistance of this organisms to sunlight.

EXPERIMENT I.—Two sets of flasks, one containing sterilised distilled water and another containing sterilised pond water were inoculated with saline emulsion of 24 hours agar culture of *B. Schafferi*. The mouths of the flasks were covered with pieces of gauze and the flasks were exposed to sunlight for a fortnight. The samples of water were then tested and *B. Schafferi* was not recovered. The test was repeated after an interval of another fortnight and the same negative result obtained.

EXPERIMENT II.—A second experiment was repeated in one of the fish breeding chambers of this Institute. The samples of water from the chamber were first tested to determine the nature of the lactose fermentors that were already present there. After ascertaining that *B. Schafferi* was not present in the chamber, 100 c.c. of saline emulsion of *B. Schafferi*, each c.c. containing approximately 10,000 million organisms were introduced into the chamber on the 20th May 1936. It must be noted that during the course of this experiment, there was rain almost every day with very little sunlight. After an interval of a week the sample of water was tested and *B. Schafferi* was recovered.

The test was repeated on 14th July 1936 and 29th July 1936. On neither of these occasions was *B. Schafferi* isolated. The above experiments corroborate the findings of Clemesha.

#### V. *To find out the efficacy of a proprietary product as a rat destructor.*

On 29th April 1936, the Port Health Officer, Rangoon, brought a bottle of **Liverpool Virus** (a proprietary product) and asked us to find out its efficacy as a rat destructor. An experiment was carried out on the same lines as has been described in last year's report with the exception that the food for the rats under this experiment was placed on the floor of the cage instead of in a receptacle. The idea of doing this was to give an enhanced chance of starting an epizootic through the contamination of the food by the faeces of infected rats. As in last year, this year's experiment also failed to produce an epizootic among the experimental rats. Two sets of experiments were carried out.

EXPERIMENT No. 1.—Two *Mus. Concolor* were fed with food mixed with the liquid supposed to contain **Liverpool Virus**. They were then



allowed to associate with 6 other healthy rats. Out of the 2 fed rats 1 died after an interval of 7 days and the other 16 days from the date of feeding. Out of the 6 healthy rats 2 rats died after an interval of 9 days and 1 died after 14 days. The remaining 3 rats did not show any sign of illness and were destroyed after about 4 weeks.

EXPERIMENT No. II.—Liverpool Virus was isolated in pure culture from the proprietary product and was used for feeding. In this experiment 4 Mus. Concolor after being fed with food mixed with saline emulsion of isolated culture of Liverpool Virus, were allowed to associate with 12 healthy rats. The fed rats died after a period of 6, 9, 15 and 39 days respectively from the date of feeding. Of the contact rats, 4 died after a period of 3, 5, 12 and 16 days respectively from the date of their coming in contact with the fed rats, while 2 contact rats died on the 23rd day. The remaining rats did not show any sign of illness and were destroyed.

An interesting fact was that Liverpool Virus could not be isolated from the carcasses of the rats, but instead B. Morgani was isolated from every case tested.

VI. *An investigation on an outbreak of Beri-Beri among the crew of S.S. "Aungban".*

The Bacteriologist of the institute was called out to investigate into the cause of an outbreak of deficiency disease occurring among the crew of an oil tanker S.S. "Aungban". A detailed report of this investigation has already been submitted, *vide* Endorsement No. 5523—7P.-1, dated the 24th November 1936.

This investigation brought out the fact that a population whose diet has been deficient in a qualitative manner may show no frank sign of disease under normal circumstances of life but, as soon as any extra demand is made on the body, the deficiency disease becomes clinically recognisable. The fact that there is a wide gulf between perfect health and the condition when obvious signs of deficiency disease appear was stressed by Sir John Boyd Orr in his address to the Blackpool meeting of the British Association.

VII. *Feeding experiment done with rice supposed to be the cause of epidemic dropsy among 1/20th Burma Rifles at Mingaladon.*

No definite conclusion could be derived from these experiments as both the groups of experimental pigeons fed on suspected rice and healthy rice, showed signs of vitamin B. deficiency. The only difference was that the pigeons fed on suspected rice alone showed the signs earlier than those fed with healthy rice only. Details of these experiments have already been submitted, *vide* Public Health Department Memorandum No. 5386, dated the 16th November 1936.



VIII. *Investigation on an outbreak of an epidemic associated with high mortality at Udo Village (Taikkyi Township).*

On receipt of information about an epidemic at Udo Village, the Assistant Bacteriologist was sent away to investigate the matter. On his arrival at the village he could not find any body suffering from the disease complained of. However, evidence was collected which pointed to the fact that the patients who had already suffered from this alimentary disturbances had been in fact attacked with cholera. Nine cases of death within a period of 8 days had occurred and the cause of death had been recorded as death due to fever. On being aware of these facts the Assistant Bacteriologist inoculated 509 people with prophylactic cholera vaccine. No further attack was reported after this incidence.

### Report of the Malariologist, Dr. U Tin, D.T.M., on the Malaria Bureau for the year 1936.

22. The Malaria Bureau records with deep regret the death of Lieutenant E.S. Feegrade, I.M.D., the Malariologist in November 1936.

23. ROUTINE WORK.—During the year under report the following routine work was carried out ;—

(i) *Instruction*.—(a) From 11th August to 31st December instruction in Medical Entomology was given to students of the Public Health Inspectors' Training Class.

(b) A short course of Instruction in Anti-malaria measures was given to the Public Health Inspectors of Maymyo and Danubyu.

(c) Demonstrations were given to the students of the Health Visitors' Training Class, Burma Government School, and the Medical College, Rangoon University.

(ii) *Identification of Anopheline Fauna*.—Specimens of larvae and imagines were received from many districts in the province. They were identified and a report submitted to the sender. Two thousand four hundred and eight larvae and five hundred and ten imagines were thus identified. No new species were recorded except the refinding in Kyaukpyu of *A. Aconitus* after being absent for 10 years.

(iii) *Spleen Census*.—Spleen census reports were received from 37 towns and 378 villages in 30 districts of the Province. During the year the districts of Thayetmyo, Henzada and Chin Hills were noted to be specially malarious.

(iv) *Blood Examinations*.—One hundred and thirty-two blood smears were examined during the year.

The officers and men of the Norwegian Motorship "Secundo" who were attacked with fever, while in Rangoon Port, were examined for malarial parasites. As the last port of call of this ship was on the



African Coast, it was thought that the ship's crew were suffering from malaria. The blood examinations, however, were found to be negative.

Other blood smears were mostly from Hanthawaddy and Insein Districts and the Southern Shan States.

(v) *Scrutiny of Weekly Reports.*—These were received from Kyaukpyu, Lashio and Maymyo, where systematic anti-malaria measures are being carried out.

*Lashio.*—In this town anti-malaria control has been practised since 1929. Steady progress is maintained in decreasing the number of breeding places by subsoil drainage. The spleen rate which stood at 47 per cent in 1926 has now been reduced to 33 per cent in 1936 in the controlled area.

*Maymyo.*—Mosquito control work continues to be vigorously carried out and judging by the results is meeting with a fair measure of success. The two carrier mosquitoes still in evidence during the year are—*A. Minimus* and *A. Annularis*, but their numbers are greatly reduced.

The breeding places of *A. Culicifacies* are being steadily eliminated and during the year very few of these mosquitoes were encountered.

*Kyaukpyu.*—Effective control is being maintained in this town. Mosquito breeding swamps are being gradually reclaimed by sea sand. The ground in some of these reclaimed areas has, however, shown a tendency to sink and form depressions. During the rains in these depressions water collects and *A. Sundaicus*, a salt water breeder, is found. The reason is that the water becomes brackish due to the sea sand and makes a favourable breeding ground for this mosquito. This defect has been to some extent rectified by refilling and oiling while the filling is in progress.

24. SPECIAL INVESTIGATIONS.—(1) An investigation into the cause of unusual sickness in Myaukchaung and Taungchaung Villages of Kawhmu Village-tract, Kungyangôn Township, Hanthawaddy District, was carried out in January. The cause of sickness was found to be malaria.

(2) A preliminary mosquito survey of the Port of Rangoon was carried out with the help of the students of the Public Health Inspectors' Class from 21st August to 8th September. The survey revealed the presence of the same mosquitoes as were found during the Mosquito Survey of Rangoon City. A most interesting finding is the breeding of *Aedes Aegypti* in the cargo lighters on Rangoon river. These craft number many thousands and to control them and prevent mosquito breeding is a difficult problem.

In view of the danger of importation of yellow fever through the acceleration of air traffic to Rangoon the question of mosquito control in the port area has become an important subject requiring serious consideration.



(3) A survey was carried out at the Pegu Yomah Water-Works construction Camp, Gyobyu, Taikkyi, for the Corporation of Rangoon, with a view to formulate control measures suitable to the existing local conditions. The result of the survey with recommendations, was embodied in a report, which was duly submitted to the Director of Public Health, Burma, for disposal.

(4) A survey was also carried out to find out the suitability of the site for the proposed Tuberculosis Sanatorium near Kalaw, Southern Shan States. The site was found to be malarious and unsuitable for housing tubercular patients.

(5) A malaria survey of Sandoway town was carried out from 21st June to 10th November 1936. The survey was started by the late Lieutenant E. S. Feegrade, I.M.D., Malariologist, and was concluded by Dr. U Tin, on account of Dr. Feegrade falling sick.

The survey revealed that malaria exists in low endemic form in the centre of town and in high endemic form towards the periphery.

The anopheline mosquitoes found to be concerned in the transmission of malaria were *A. Culicifacies*, *A. Maculatus* and *A. Minimus*.

A detailed survey report is now in the press.

25. EXPERIMENT.--Pyrocide No. 20, a standardized concentrated extract of pyrethrum flowers, was investigated for its insecticidal properties. The concentrated extract was mixed with refined kerosene in the proportion of 1 in 19. The insecticide was found to give excellent results.

26. FISH BREEDING.—During the year under report a large gambusia hatchery was built in the compound of the Harcourt Butler Institute of Public Health, Rangoon. This hatchery was designed with a view to obtain a maximum number of young fish in a confined area. It was used with effect from 20th December 1936. It is anticipated that at least 3,000 fish will be available for distribution monthly.

The table below shows the number of gambusia distributed :—

Insein and Hanthawaddy Districts	...	2,780
Rangoon	... ..	750
Tavoy	... ..	400
Sandoway	... ..	100
Maymyo	... ..	600
Pyapôn District	... ..	600
Lashio, Northern Shan States	... ..	200
Total	...	5,430

In August a circular was sent to all districts where fish had been introduced, to submit a statement of their progress. Statements from 25 places were received. The reports were very satisfactory.

A scheme for establishing subsidiary hatcheries in the malarious districts of Burma is under consideration and it is hoped that 12 such hatcheries will be established during the year.



27. MISCELLANEOUS ACTIVITIES.—The Malaria Bureau undertook a large amount of Red Cross work. The posters and models on health subjects seen in the yearly Health Exhibition are executed in the Bureau.

**Report of the Assistant Chemist Mr. G. C. Moitra, B.Sc., F.C.S., on the Chemical Section for the year 1936.**

28. EXAMINATIONS.—A total of 816 samples comprising 331 samples of water, 29 samples of sewage effluents and 456 samples of miscellaneous foods and drugs were examined during the year under report.

The number of water samples received for examination from different sources is shown in the following table. Forty-nine samples of water from new tube wells were examined for the issue of permanent license under the Burma Underground Water Act.

Source.			Number examined.
Public Health Department	..		6
Public Works Department	...		7
Public Works Department (under B.U.W.A.)			49
Municipalities	...	...	102
District Health Officers	...	...	45
Town Committees	...	...	10
Hospitals	...	...	1
Jails	...	...	58
Civil Surgeons	...	...	6
Rangoon Port Trust	...	...	11
Burma Railways	...	...	2
Others	...	...	34
Total			331

All the 29 samples of sewage effluents were received from the Public Works Department.

The samples of miscellaneous foods and drugs were mainly received from the Port Health Department.

A detailed statement of the 456 samples of miscellaneous foods and drugs examined is appended.

29. ROUTINE ANALYSIS—*Ghee*.—Out of 10 samples of ghee found adulterated or otherwise unsatisfactory, 9 were received from the Port Health Officer, Rangoon, and 1 from Dr. K. T. Jungalwalla, Assistant Director of Public Health, Burma. The ghee received from Dr. Jungalwalla, although genuine, was found to be extremely rancid and was unsatisfactory in this respect. Of the 9 samples received from the



Port Health Officer, 4 were slightly adulterated, 2 were found to be entirely vegetable fat, and the remaining 3 were adulterated approximately with 25·0 per cent, 89·0 per cent and 94·0 per cent respectively of vegetable fat.

*Mustard Oil*.—Of the 24 samples of mustard oil received for examination from the Port Health Department, 7 were found to be adulterated with groundnut oil in varying proportions ranging from 8·0 per cent to 25·0 per cent approximately, and in one of these traces of sesame oil was also detected.

*Patent Medicine*.—One sample of a preparation under the name of "Antitap"—a malaria specific, was received from the Malaria Bureau for determination of the quinine content. The total contents of the bottle measured 75 c.c. and the total quinine content was 21·1 grains only as quinine sulphate. According to the directions for use furnished therewith, the bottle contained 9 adult doses which provides only 2·34 grains of quinine sulphate per dose.

*Rice*.—Fifty samples of rice out of a total of 98 samples examined were found to be below 0·40 per cent in phosphoric anhydride content. The samples have been grouped as follows according to their phosphoric anhydride content :—

Phosphoric anhydride content.		Number of samples.
From 0·20 per cent to 0·29 per cent	...	6
From 0·30 per cent to 0·39 per cent	...	44
From 0·40 per cent to 0·49 per cent	...	31
From 0·50 per cent to 0·59 per cent	...	16
0·60 per cent and above	...	1
Total	...	98

A sample of rice taken by the Port Health Officer, Rangoon, from the M.V. "Derbyshire" on 26th March 1936, was found to contain a very high proportion of phosphoric anhydride, viz., 0·65 per cent. The sample was parboiled rice.

30. INVESTIGATION AND RESEARCH—*Grease and oil mixture*.—Under instructions from the Director of Public Health, Burma, this investigation was taken up. Twenty-four samples of this mixture were purchased personally by the Head Clerk of the Institute from different quarters of the town. All the samples were sold as comparatively cheaper brands of ghee intended for human consumption, e.g., paratta frying, etc., and not as lubricating oils for machinery. The prices tendered for the article were found, in certain cases, to be equal to the actual retail price of genuine ghee.

A table showing details of these samples together with their analytical constants is appended.



Of the 24 samples examined, 15 were found to be entirely vegetable fat. Sample No. 2 contained the maximum quantity of ghee, *viz.*, 55.0 per cent and the rest from 2 to 12 per cent of genuine ghee. Besides, sample Nos. 7, 13, and 17 were found to be extremely rancid, and as such, unfit for human consumption.

*Wheat flour and atta.*—Twelve samples of wheat flour and 4 samples of atta were examined with a view to finding out a relation between their protein and gluten contents. In this connection, 8 other samples of atta were examined in the previous year and the investigation is now completed.

*Vegetables.*—Some of the common vegetables largely used by Burmans were examined for their calorific values. This investigation is still being continued.

*Dried fish.*—Eight samples were examined during the year. This article of food is very largely used by Burmans and Indians alike and the investigation was taken up to determine its food value. A large amount of work in this line is intended to be carried out in this laboratory.

31. MISCELLANEOUS ACTIVITIES—*Laboratory Reagents.*—This section prepares most of the chemical reagents required for the various analytical works it carries out. The standardization of acids and alkalies against standard solutions obtained from England is done as well. The preparation of important chemical reagents, *viz.*, Millon's reagent, etc., for the Bacteriological Department is also undertaken by this section.

Forty-six samples of broth were examined for the oxygen absorbed figure. This test is now regularly done for the Bacteriological Section.

Several samples of cholera vaccine were also examined for determination of the concentration of carbolic acid.

32. TEACHING.—This is one of the heaviest items in the routine duties of this department.

(i) *Public Health Inspectors' Training Class.*—Thirty-three lectures in Physics and Chemistry were given to the students of this class.

(ii) *Burma Health School.*—Twenty-three lectures and demonstrations in elementary Physics and Chemistry were given to the students of the Burma Health School.

(iii) *Medical School and Medical College.*—A few lectures and demonstrations were given to the students of the third year of the Medical School and the fourth year of the Medical College on the routine analysis of water, milk, rice and ghee.

Examinations in Physics and Chemistry, both written and oral, were held for the students of the Burma Health School on completion of their course of lectures.

33. HEALTH EXHIBITION.—The annual Health Exhibition is another activity of this department, which is responsible for the technical food and water stalls.

*Detailed Statement of the various Foods and Drugs examined during the year ending 31st December 1936.*

Description of Samples.					Number examined.	Number adulterated or otherwise unsatisfactory.	Percentage of adulteration.
Atta	...	...	...	...	7	...	...
Beans	...	...	...	...	2	...	...
Brandy	...	...	...	...	1	...	...
Broth	...	...	...	...	46	...	...
Coffee	...	...	...	...	1	...	...
Cucumber (African)	...	...	...	...	1	...	...
Dhal	...	...	...	...	2	...	...
Dried fish	...	...	...	...	8	...	...
Flour (wheat)	...	...	...	...	22	...	...
Ghee	...	...	...	...	125	10	8'0
Gourd (snake)	...	...	...	...	1	...	...
Gourd (white)	...	...	...	...	1	...	...
Grease and oil mixture	...	...	...	...	24	...	...
Hilsa fish	...	...	...	...	1	...	...
Kaing-oo	...	...	...	...	1	...	...
Lemon Barley water	...	...	...	...	1	1	100'0
Lime (slaked)	...	...	...	...	1	...	...
Milk, fresh	...	...	...	...	13	5	38'5
Milk, breast	...	...	...	...	5	...	...
Oil, mustard	...	...	...	...	24	7	29'2
Patent medicine	...	...	...	...	1	...	...
Peas	...	...	...	...	1	...	...
Rice	...	...	...	...	98	50	51'0
Rice Bran	...	...	...	...	36	...	...
Tablets, Cinchona febrifuge	...	...	...	...	12	...	...
Tablets, Quinine sulphate	...	...	...	...	9	...	...
Vaccine, Cholera	...	...	...	...	8	...	...
Water deposit	...	...	...	...	1	...	...
Waste oil	...	...	...	...	2	...	...
Whisky	...	...	...	...	1	...	...
Total					456	73	...



Statement showing details of an Investigation carried on a few samples of Ghee purchased from Bazaar.

Number of Samples. (1)	Source. (2)	Price per viss. (3)	Analytical figures.					Remarks. (9)
			Melting point. (4)	Reichert value for 5 grams. (5)	Saponification value. (6)	Butyro refractometer reading at 40°C. (7)	Acid value (expressed as oleic acid). (8)	
		Rs. A.					Per cent.	
1	No. 359, Barr Street, Rangoon	2 4	45.0°C	0.63	187.9	54.3	1.11	Entirely vegetable fat.
2	No. 180, Fraser Street, Rangoon	2 4	39.4°C	14.90	205.0	48.6	2.07	Approximately 55.0 per cent ghee and 45.0 per cent vegetable fat.
3	No. 33-34, Suratee (B) Bazaar	1 8	45.2°C	0.32	186.5	54.2	1.16	Entirely vegetable fat.
4	No. 23-24, Suratee (B) Bazaar	1 0	39.8°C	0.22	185.5	54.9	2.02	Do.
5	No. 10, Upper Pazundaung Road	0 12	42.4°C	0.55	188.0	54.0	2.70	Do.
6	No. 16, Upper Pazundaung Road	1 0	38.8°C	3.48	197.9	49.9	2.65	Approximately 10.0 per cent ghee and 90.0 per cent vegetable fat.
7	No. 20, Upper Pazundaung Road	1 8	41.0°C	3.00	195.7	50.9	7.29	Approximately 8.0 per cent ghee and 92 per cent vegetable fat
8	No. 28, Upper Pazundaung Road	0 12	40.4°C	0.11	175.7	55.4	1.59	Entirely vegetable fat.
9	No. 759, Dalhousie Street, Lanmadaw Block.	1 0	40 8°C	0.21	187.0	55.3	2.04	Do.
10	No. 762, Dalhousie Street, Lanmadaw Block.	0 12	41.0°C	0.14	189.4	55.0	2.80	Do.
11	No. 754, Dalhousie Street, Lanmadaw Block	0 12	41.9°C	0.21	188.3	54.7	2.77	Do.
12	No. 339, Iron Bazaar, Lanmadaw Block.	1 12	46.0°C	1.76	191.7	53.4	0.56	Approximately 3.0 per cent ghee and 97.0 per cent vegetable fat.

13	No. 3, Shwe-la-Win Street, facing Sangyaung Bazaar.	0 12	25.4°C	3.66	197.7	53.7	8.07	Approximately 10.0 per cent ghee and 90.0 per cent vegetable fat.
14	No. 7, Shwe-la-Win Street, facing Sangyaung Bazaar.	1 0	38.4°C	0.29	185.3	52.5	0.12	Entirely vegetable fat.
15	No. 153, Bagaya Road	1 0	40.2°C	0.22	185.5	54.8	2.32	Do.
16	No. A shop at corner of Mingala Street, and Shan Road.	2 8	39.6°C	1.60	191.2	52.8	0.66	Approximately 2.0 per cent ghee and 98.0 per cent vegetable fat.
17	A chulia shop close to Mill Road Beef Bazaar.	1 0	56.5°C	0.78	182.9	52.2	13.44	Entirely vegetable fat.
18	A chulia shop at corner of Ohn Ghine Road and 119th Street.	1 8	44.5°C	0.37	186.6	55.1	1.12	Do.
19	No. 118-19, Mill Road	1 8	42.6°C	1.88	191.8	53.5	2.26	Approximately 3.0 per cent ghee and 97.0 per cent vegetable fat.
20	No. 151, Bow Lane	2 8	42.0°C	2.62	192.2	53.3	1.19	Approximately 6.0 per cent ghee and 94.0 per cent vegetable fat.
21	No. 159, Bow Lane	1 0	49.8°C	0.33	186.2	53.2	0.12	Entirely vegetable fat.
22	No. 186, Bow Lane (near Lumber shops).	2 0	38.6°C	4.03	193.1	50.8	0.34	Approximately 12.0 per cent ghee and 88.0 per cent vegetable fat.
23	No. 197, Bow Lane	2 8	40.5°C	1.36	190.2	53.9	0.92	Entirely vegetable fat.
24	No. 223, Bow Lane	2 0	46.6°C	0.66	189.1	54.5	0.55	Do.











